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Beaver Valley Power Station
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September 10, 1998
L-98-180

Beaver Valley Power Station, Unit No. 1
Docket No. 50-334 License No. DPR-66
LER 98-028-00

United States Nuclear Regulatory Commission
Document Control Desk
Washington, DC 20555

In accordance with Appendix A, Beaver Valley Technical Specifications, the following Licensee Event Report is submitted:

LER 98-028-00, 10 CFR 50.73(a)(2)(iv), "Automatic Reactor Trip On 'A' Steam Generator Low Level Coincident With Steam Flow/Feed Flow Mismatch Signal From Manually Tripped Transmitter Bistables of F-MS-475."

R. D. Brandt
R. D. Brandt

Attachment

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LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (MNBB 7714), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

FACILITY NAME (1)

Beaver Valley Power Station Unit 1

DOCKET NUMBER (2)

05000334

PAGE (3)

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TITLE: Automatic Reactor Trip On 'A' Steam Generator Low Level Coincident With Steam Flow/Feed Flow Mismatch Signal From Manually Tripped Transmitter Bistables of F-MS-475

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
8	11	98	98	028	00	9	10	98		
OPERATING MODE (9)		1	20.402(b)			20.405(c)		X	50.73(a)(2)(iv)	73.71(b)
POWER LEVEL (10)		20	20.405(a)(1)(i)			50.36(c)(1)			50.73(a)(2)(v)	73.71(c)
			20.405(a)(1)(ii)			50.36(c)(2)			50.73(a)(2)(vii)	OTHER
			20.405(a)(1)(iii)			50.73(a)(2)(i)			50.73(a)(2)(viii)(A)	(Specify in abstract below and in Text NRC Form 366A)
			20.405(a)(1)(iv)			50.73(a)(2)(ii)			50.73(a)(2)(viii)(B)	
			20.405(a)(1)(v)			50.73(a)(2)(iii)			50.73(a)(2)(x)	

LICENSEE CONTACT FOR THIS LER (12)

NAME

R. D. Hart, Senior Licensing Supervisor

TELEPHONE NUMBER (include Area Code)

(412) 393-5284

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS
X	SB	IMOD	W120	Y						

SUPPLEMENTAL REPORT EXPECTED (14)

YES (if yes, complete EXPECTED SUBMISSION DATE)	X	NO	EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR

ABSTRACT (Limited to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)

On 8/11/98 at about 1512 hours, while placing Unit 1 'A' Steam Generator (SG) feedwater (FW) flow control valve FCV-FW-478 into service, SG level decreased and an automatic reactor trip at about 20% power occurred due to SG low level (25%) coincident with a SG steam/feed flow mismatch. Prior to this event, the transmitter bistables of the SG Main Steam (MS) Channel IV flow indicator F-MS-475 had been manually tripped to comply with Technical Specifications due to downscale indication. Following the reactor trip, emergency operating procedures were entered and the Unit was stabilized.

Investigation has determined, the root causes of this event are cognitive error (inadequate awareness) by the involved licensed and non-licensed shift operating personnel to fully recognize the consequences of tripping the F-MS-475 transmitter bistables and inadequacy of the procedure 10M-52.4A for placing FCV-FW-478 into service. Event contributors: incomplete shift briefing following the decision to trip the F-MS-475 bistables, inadequate instrument failure (IF) procedure 10M-24.4.IF for F-MS-475, and a station decision to continue with plant startup based on inadequate expectations for SG level control during FW control transfers.

F-MS-475 was repaired and returned to service. 10M-52.4A has been revised. The adequacy of existing IF procedures will be evaluated to identify any required changes.

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		98	028	00	

TEXT (If more space is required, use additional copies of NRC Form 366A) (17)

PLANT AND SYSTEM IDENTIFICATION

Westinghouse Pressurized Water Reactor {AB}*

Reactor Protection System (RPS) {JC}*

A Steam Generator Loop 1 Channel IV Main Steam (MS) Flow Transmitter FT-MS-475A {SB/FT}*

A Steam Generator (SG) Feedwater (FW) Flow Control Valve FCV-FW-478 {JB/FCV}*

* Energy Industry Identification System (EIIS) system and component function identifier codes appear in the text as {XX/XXX}

Initial Conditions

Following an extended Unit outage, Beaver Valley Power Station (BVPS) Unit 1 Reactor startup commenced, at approximately 0603 hours on August 11, 1998. Reactor criticality was achieved, at approximately 0715 hours, and power ascension commenced.

At approximately 1240 hours, the 'A' SG MS Channel IV flow indication F-MS-475 {SB/FI} and corresponding Safety Parameter Display System (SPDS) point {IO/FI} was noted to be failed downscale. The instrument failure procedure, 10M-24.4IF, was entered and F-MS-475 was declared inoperable, in accordance with Action 7 of TS Table 3.3-1. Alternate SG MS flow (Channel III) indication F-MS-474 was selected as the controlling channel. The station determined that Reactor power ascension could continue with the F-MS-475 channel failed and the Unit was synchronized to the main power grid, at approximately 1313 hours. FW control was being maintained on the bypass (flow control) regulating valves {BP/FCV}. At approximately 1427 hours, repair of the indication problem with F-MS-475 began in accordance with maintenance surveillance procedure 1MSP-21.29-I.

At approximately 1455 hours, the F-MS-475 channel transmitter bistables were tripped to comply with the TS required action. Tripping the bistables satisfied the steam/FW flow mismatch portion of the reactor trip signal on a coincident low SG level signal. With the bistables tripped, a Reactor trip could then occur on a 'A' SG level of 25%. This reduced the SG operating level margin to 14% within which the Operator could recognize and turn around a SG level perturbation prior to reaching the SG low level trip.

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EVENT DESCRIPTION

At shortly before 1512 hours on August 11, 1998 with the Reactor power at approximately 20%, action was in progress to place the 'A' SG main FW regulating valve, FCV-FW-478, into service in automatic control. The Licensed Nuclear Control Operator dedicated to this evolution encountered unexpected sluggish response from the valve controller demand input. Despite compensatory actions to increase FW flow through FCV-FW-478, a downward trend in SG level followed. SG level decreased to the 'A' SG 25% low level setpoint, which initiated an automatic RPS Reactor trip on SG steam/FW flow mismatch coincident with low SG level, at approximately 1512 hours. Shortly thereafter, SG level was returned to within the program value. The plant entered the Emergency Operating Procedures (EOPs) and the Unit was stabilized. The EOPs were then exited, and station recovery from the Reactor trip was begun.

REPORTABILITY

This occurrence constitutes a non-emergency event/automatic ESF actuation. The required 4-hour NRC notification of this event, per the reporting criteria of 10CFR50.72(b)(2)(ii) was made at approximately 1827 hours on August 11, 1998. In addition, this event is applicable to the Licensee Event Report (LER) reporting criteria of 10CFR50.73(a)(2)(iv).

CAUSE OF EVENT

The reactor trip occurred due to the low level condition in 'A' SG, which completed the trip logic of SG steam flow/FW flow mismatch coincident with low SG level. Investigation has determined, the root causes of this event are cognitive error (inadequate awareness) by the involved licensed and non-licensed shift operating personnel to fully recognize the consequences of manually tripping the F-MS-475 transmitter bistables and inadequacy of the procedure for transferring SG FW control from the bypass to the main FW control valves, 10M-52.4A (ISS3). Contributors to this occurrence:

- The involved IF procedure did not provide a specific note, caution, or detailed description of a failure effect for the SG level trip setpoints or how the SG level operating band is affected by tripping the bistables.
- The involved Licensed Operations crew did not adequately recognize or completely discuss within a shift briefing the change to the SG level operating band due to tripping the bistables of F-MS-475.

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CAUSE OF EVENT (continued)

- Based on prior experience of successful main FW control transfers using the procedure steps in effect on August 11, 1998, Station Management determined that continuing the plant startup with the F-MS-475 transmitter bistables tripped was acceptable. Prior successful Unit startups were based on expectations where main FW control transfers would result in relatively large SG level swings in excess of the +/- 5% deviation alarms. After the August 11, 1998 event, it was realized these expectations were inadequate and the standards needed to be emphasized to stay within the deviation alarms.

Component Interfaces

(F-MS-475)

Investigation determined the down scale indication of F-MS-475 resulted from a failed signal isolator module in the FT-MS-475 flow transmitter.

(FCV-FW-478)

Following the Reactor trip, investigation determined that FCV-FW-478, Copes Vulcan, Model No. AV112100, was working properly. In March of 1998 the gain setting of the valve actuator had been adjusted slightly to reduce or eliminate minor valve oscillations. At the time of the event, the post-maintenance test Operations sign-off for acceptance of the valve adjustments was pending return of the valve to service for confirmation of operability. Subsequent evaluation of the valve actuator gain setting at the time of the trip has determined that the gain setting would have had a negligible effect on proper functioning of the valve at the time of the event. The valve actuator gain was then adjusted and the valve was returned to service.

SAFETY IMPLICATIONS

In response to the incurred Reactor trip, plant systems functioned as designed and, as such, there were minimal implications to the health and safety of the public.

CORRECTIVE ACTION

- The F-MS-475 transmitter failed signal isolator module, Westinghouse, Model No. 4111083-G02, was replaced and the indicator was returned to service.

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CORRECTIVE ACTION (continued)

2. Prior to subsequent startup of the Unit, 10M-52.4A (ISS3), was revised to provide better guidance on placing SG FW control on the main regulating valves and establish stronger emphasis on limiting SG level swings. Following revision of the procedure, significant improvement in FW control was experienced during subsequent restart of the Unit.
3. Prior to subsequent startup of the Unit, a pre-shift briefing was conducted with the Control Room operators who performed the subsequent startup in order to discuss this event and the effect of the F-MS-475 flow channel failure on the SG operating band. In addition, pre-job briefs were conducted with the Operating crew, which performed the startup, to emphasize the need to make conservative decisions regarding manual action necessary when automatic functions may be challenged.
4. Prior to the FW valve control transfer as part of the subsequent Unit 1 startup, a pre-job brief was conducted with the Operating crew that performed this evolution in order to ensure their awareness of any changes to valve gain adjustments that may affect FW valve performance.
5. By September 30, 1998, any remaining Unit 1 Licensed Operators will receive the above described pre-shift and pre-job briefs.
6. Prior to subsequent Unit 2 startup, pre-shift briefs will be conducted with Unit 2 Licensed Operators to discuss this event and the effect of the subject F-MS-475 flow channel failure on the SG operating band. In addition, prior to subsequent transfer of Unit 2 FW to main control, a pre-job brief will be conducted with the involved Operations crew to emphasize the need to make conservative decisions regarding manual action necessary when automatic functions may be challenged.
7. By November 11, 1998, the adequacy of existing instrument failure procedures will be evaluated to identify any required changes.

PRIOR SIMILAR OCCURRENCES

Review of BVPS LERs submitted over the past two years identified the following as similar events:

LER 2-94-007-00, "ESF Actuation - Feedwater Isolation Due to Steam Generator Level",

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PRIOR SIMILAR OCCURRENCES (continued)

LER 1-96-003-00, "ESF Actuation - Feedwater Isolation Due to Steam Generator Water Level Transient".

CATEGORY 1

REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

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 AUTH.NAME AUTHOR AFFILIATION
 HART,R.D. Duquesne Light Co.
 BRANDT,R.D. Duquesne Light Co.
 RECIP.NAME RECIPIENT AFFILIATION

SUBJECT: LER 98-028-00:on 980811,reactor trip occurred.Caused by
 cognitive error by involved licensed & non-licensed shift
 operating personnel.F-MS-475 repaired & returned to svc.
 With 980910 ltr.

DISTRIBUTION CODE: IE22T COPIES RECEIVED:LTR 1 ENCL 1 SIZE: 7
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